

its size, depth, and geological relations, the beauty of its environment, and the unique charm of the two picturesque volcanic islets Martana and Bisentina, all combine to render the lake attractive.

Before the preliminary operations of the Geographical Society, very little was known about the lake except with regard to the geology and morphology of its basin; the contours of the bottom had been carefully mapped by De Agostini, who had made no fewer than 3000 soundings. No regular observations of the seasonal temperatures of its waters or of the variations in their level, of *seiches* or of lacustrine plankton, had ever been carried out.

From a preliminary report prepared by Prof. Luigi Palazzo,¹ we learn that limnological stations equipped with Sarasin's limnograph and with other instruments have been established on opposite sides of the lake at Bolsena and at Marta, and that at chosen points in the immediate vicinity five meteorological stations are to yield continuous records of the rainfall and air temperature. A gauge for measuring the height of the water has also been fixed to a pier in the Fiume Marta.

One of the most interesting phenomena of which a continuous record will be kept are the *sesse* or *seiches*, the rhythmical oscillations of the surface of the lake,



FIG. 1.—Isola Martana.

which have a regular period of 12 to 15 minutes, and are more conspicuous at Marta than at Bolsena, apparently on account of the position of the former village nearer the major diameter of the lake, and on account of differences in the declivity of the bottom. A rise of the water of 7 inches at Marta was noticed to be correlated with a rise of only 4 inches at Bolsena. On occasions the rise of water may amount to a foot, and the *seiches* are then so noticeable that the common folk, in their expressive dialect, declare that the lake is panting (*trenfia*).

We hope that the full reports on the physical problems connected with the lake may soon appear, and that the investigation of the plankton will not be forgotten.

R. T. GÜNTHER.

NOTES.

It is proposed to fix a standard time for use upon all Indian railways and telegraphs, which shall be exactly $5\frac{1}{2}$ hours in advance of Greenwich time, and to fix for Burma a standard $6\frac{1}{2}$ hours in advance of Greenwich. The Government of India has intimated that it is in favour of the adoption of the new standard for general as well as for railway and telegraphic purposes, and is prepared to

¹ "La Stazione Limnologica di Bolsena." Pp. 19; 9 figs. 1 pl. (*Boll. Soc. Geogr. Ital.*, v. 1904.)

cooperate in any movement with this end in view; but as the matter is one upon which the local communities should be consulted, the opinions of the Chambers of Commerce upon the proposals are being sought by the Government.

THE death is announced of Dr. Petr Petrovic van der Vliet, emeritus professor of physics at the University of St. Petersburg, aged sixty-five.

At the beginning of next month Prof. H. Battermann, observer at the Berlin Observatory, will take the position of professor of astronomy at Königsberg University, and director of the observatory there.

IN a message from Ponta Delgada (Azores) on September 1, Captain Scott states that the Antarctic ship *Discovery* may be expected to arrive at Spithead about September 10.

A LIFE-SIZED bronze bust of the late Sir Richard Temple was unveiled last week in the parish church of Kempsey, near Worcester, by the Earl of Coventry, Lord Lieutenant of Worcestershire. The inscription is as follows:—"The Right Hon. Sir Richard Temple, Bart., G.C.S.I., C.I.E., D.C.L., LL.D., F.R.S., sometime Governor of Bombay and Finance Minister of India, and M.P. for Evesham and Kingston."

THE Chancellor of the Exchequer has appointed the following gentlemen to serve as members of a committee to inquire into the use of duty-free alcohol for industrial purposes:—Sir Henry Primrose, K.C.B., C.S.I., chairman; Sir William Crookes, F.R.S.; Sir W. H. Holland, M.P.; the Hon. J. Scott-Montagu, M.P.; Mr. Lothian D. Nicholson; Dr. W. Somerville; Dr. T. E. Thorpe, C.B., F.R.S.; and Mr. Thomas Tyrer.

THE fifteenth annual general meeting of the Institution of Mining Engineers will be held at Birmingham on September 14. The following are among the papers to be read, or taken as read:—The mining department of the University of Birmingham, Prof. R. A. S. Redmayne; coal-mining in Asturias, Prof. Henry Louis; the problem of Gob-fires, Mr. George Farmer; an improved apparatus for laying the dust in coal-mines, Mr. J. Creswell Roscamp; mine-surveying instruments, part ii., Mr. Dunbar D. Scott; and the problem of dynamic balance, Mr. E. H. Robertson.

THE latest proceedings of the Indian Tea Association contain several items of interest in connection with the proposed scientific experimental station in Assam. We learn from the *Pioneer Mail* that the scientific adviser of the association recently explained his proposals for the permanent location of his assistant in Assam, for the provision of a laboratory for him, and the initiation of experiments in tea culture under his direct supervision and control. An offer has been made by the agents of the Scottish Assam Tea Company to provide a small bungalow and tea for experiment in the immediate neighbourhood of the bungalow, and further land for experiments as required. It was decided to accept the offer of the Scottish Assam Tea Company, and arrangements have been made for the erection of a laboratory.

IN connection with the recent announcement of the death of the Rev. George Pirie, LL.D., professor of mathematics in the University of Aberdeen, the following particulars may be of interest. Dr. Pirie was born at Dyce on July 19, 1843, being the eldest son of the Very Rev. Principal Pirie. His early years were spent at Aberdeen Grammar School,

and he afterwards studied at the university in the same town. In 1863 he entered at Queens' College, Cambridge, and three years later took the mathematical tripos, obtaining the degree of fifth wrangler. He was subsequently elected to a fellowship at Queens' College, where he also held office both as mathematical lecturer and as college tutor. In 1878 Dr. Pirie was elected to the chair of mathematics at Aberdeen University, which he held until his death. Dr. Pirie's interest in mathematics does not appear to have carried him much beyond ordinary routine work, as his name does not appear as the author of papers in the leading mathematical journals to which reference has been made in connection with the present notice. He, however, published one text-book, entitled "Lessons in Rigid Dynamics."

Most of our readers remember that the year 1903 was one of unusually heavy rainfall. "British Rainfall" for that year, recently published, contains tables of nearly 4000 stations, and supplies every possible information upon the subject that can be wished for. The work has been issued in practically the same form since 1861, a fact which, we consider, much enhances its value; but the materials have continually increased, and its size has been doubled in the last thirty years. The volume before us has, moreover, several important additions, e.g. a section dealing with the duration of rainfall, and rules for rainfall observers. Special articles deal with the extraordinary excess of precipitation in June (accompanied by useful maps) and with the three wettest years in the annals of "British Rainfall," viz. 1872, 1877, and 1903. Dr. Mill states that only one other year earlier in the nineteenth century can compare with them, and that is 1852. Whereas the average annual rainfall of the British Isles is 39.5 inches, 53 inches fell in 1872, 51 inches in 1877, and 52 inches in 1903, an excess of 32 per cent. The total rainfall over England and Wales during three days, June 13 to 15, is estimated at 5348 million tons.

WE have received from the Government Astronomer of Western Australia (Mr. W. E. Cooke) a copy of the meteorological observations made at the Perth Observatory and other places in the colony during 1902. Morning and evening weather forecasts—the latter intended for newspapers—form part of the routine work, and are very successful; in fact, complete failure is of very rare occurrence. In connection with forecasts, Mr. Cooke states that the prediction of rainfall throughout the interior, for several days in advance, was attended with complete success, and that the experiment indicates a forward step in practical meteorology. In addition to monthly and yearly summaries for a number of stations, the report contains coloured maps showing for each month and for the year the mean distribution of the various elements over the whole of the colony.

IN a communication to the Société Française de Physique, No. 216, 1904, M. Bouty describes experiments on the dielectric cohesion of argon and mercury vapour. The dielectric cohesion of argon is exceptionally small, its value being only about one-seventh of that of hydrogen. The smallest trace of impurity increases the value, and the author recommends the measurement of the dielectric cohesion as a means of testing the purity of argon, the sensitiveness of the test being comparable with that of the spectral examination.

WE have received from the author, Dr. F. Braun, a reprint of an important paper appearing in the *Physikalische Zeitschrift* (No. 8, pp. 194-9) entitled "Methoden zur Vergrößerung der Senderenergie für drahtlose Tele-

graphie." Dr. Braun discusses the limits of the possible increase of capacity and voltage—and therefore of energy—of the usual sending devices employed in wireless telegraphy, and describes many new arrangements consisting of combinations of capacities and inductances for which considerably greater efficiency is claimed.

DR. BRAUN also sends us a copy of an article on "Herstellung doppelt brechender Körper aus isotropen Bestandteilen" (*Physikalische Zeitschrift*, No. 8, pp. 199-203), in which he suggests that a doubly refracting body may consist in a homogeneous mixture of isotropic particles of two kinds the dielectric constants of which are different, the distribution of the particles being regular, but different in three principal directions. In illustration of the suggestion, experiments are described in which the body consisted of fire-bricks with air spaces between them. On passing plane-polarised electric waves through different thicknesses, the waves on issuing exhibited plane, circular, or elliptic polarisation according to the thickness of the body through which they passed. The experiments were conducted on a somewhat gigantic scale.

IN No. 1, vol. ix., of *Terrestrial Magnetism and Atmospheric Electricity*, the aims and organisation of the department of international research in terrestrial magnetism of the Carnegie Institution are defined. The director is Dr. L. A. Bauer. Of the first allotment of 20,000 dollars, one half is to be devoted to office expenses, comprising the reduction, discussion, &c., of existing data, the second half being reserved for observational and experimental work. If satisfactory results are obtained during the first year, the same sum of 20,000 dollars is to be granted annually to the department. The aim of the department is to undertake investigations of an international character which are not specifically the subject of inquiry of any one country, such, for instance, as a magnetic survey of ocean areas and unexplored regions, observations of the variation of the earth's magnetism, and magnetic observations in ocean depths and in atmospheric regions.

WE have received Nos. 6 and 7 of the series of monographs now being published under the title of "Attualità scientifiche," by Nicola Zanichelli, of Bologna. No. 6 (pp. 68) is a reprint of a lecture, delivered before the Italian Electrotechnical Association by Prof. Augusto Righi, on our present knowledge of radium. No. 7 (pp. 141) is a useful summary by Lavoro Amaduzzi of the investigations which have hitherto been made of the physical properties of selenium, particularly as regards the variation of its electrical properties under the influence of light; the practical application of the element in the photophone and in telephotography is dealt with in detail. As each monograph is written by a specialist, the series is likely to be of use not only to the general scientific reader, but also to those workers who are investigating the problems dealt with. Thus in the number dealing with radium, there is a description of new forms of the gold-leaf electroscope and of the torsion-balance which are suitable for detecting and measuring minute traces of radio-activity, whilst the treatise on selenium is of particular value on account of the complete bibliography of the subject which it contains. We may note that the earlier numbers of the series deal with the discharge of electricity through gases, with "chemical problems of the new century," with morphological and chemical evolution, and with the biological problem of the determination of sex.

IN the *Zeits. für Instrumentenkunde* for July Messrs. Elster and Geitel describe a new form of apparatus for measuring the radio-activity of soils and of the mud or sediment of thermal springs. The increase in the conductivity of a constant volume of air, which is caused by its exposure, in a metal cylinder, to the action of the radio-active material, is measured by means of a modified form of Exner's electroscope. The especial features introduced into the electroscope are the insulation of the aluminium leaves by means of amber, and the production by means of metallic sodium of a dry atmosphere in the space in which the leaves are suspended. Measurements which were made of the ionising power and of the rate of decay of the emanation of "fango" or mud from the hot springs of Battaglia, would indicate that its activity is due solely to the presence of radium. In a paper contained in the June number of *Terrestrial Magnetism and Atmospheric Electricity* the same authors put forward the view that the conductivity of the atmosphere is largely, if not entirely, due to a radio-active emanation which issues from the earth's crust. In support of their contention, they have observed that the conductivity of air in closed cellars and in deep holes or wells is sometimes fifty times as great as that of normal air. Their view would also explain the fact that at low barometric pressures the conductivity of the atmosphere is much greater than at higher pressures, for a low pressure would favour the escape, from the fissures of the earth's crust, of the radio-active emanation. It is also possible that the electric phenomena which occur over the crater of a volcano are caused by an active emanation accompanying the vapours issuing from the crater.

WE are indebted to Mr. Quaritch, of Piccadilly, for a copy of a catalogue of rare and valuable works, including many on biological and sporting subjects.

THE report of the Maidstone Museum for 1903 records the capture in Maidstone of an apparently freshly-emerged specimen of the silver-striped hawk-moth (*Chaerocampa celerio*). Although the larva has been from time to time observed in the country, English specimens of this moth are generally considered to be immigrants from the Continent. Other specimens are stated to have been taken in England in 1903, but the last great "celerio-year" was 1885.

THE most striking feature of the report of the Field Columbian Museum for 1902-3 is formed by two plates representing groups—the one of the dibatag, or Clarke's gazelle, and the other of the spotted hyæna—mounted in the museum. Of the dibatag no less than six individuals, of different ages and sexes, are exhibited, one of the bucks being mounted in a characteristic attitude, with the neck and tail erect. It is a matter for regret that funds and space are not forthcoming for mounting groups of this nature in our own Natural History Museum. One day it will be too late to do so. We have also received from the Field Museum copies of two papers by Dr. D. G. Elliot on new mammals.

"DINOSAUR-HUNTING" in the Como Bluffs of Wyoming, according to the graphic description given by Prof. H. F. Osborn in the September number of the *Century Magazine* under the title of "Fossil Wonders of the West," must be an exciting sport, and one in which there are few blank days. The Bone Cabin Quarry, which was accidentally discovered in 1897, seems, indeed, to be the richest deposit of dinosaurian remains hitherto known—so numerous

being the weathered-out bones that the shepherds actually built their huts from the vertebræ and ribs. "Here," writes the author, "are the largest of the giant dinosaurs closely mingled with the remains of the smaller but powerful carnivorous dinosaurs which preyed upon them, also those of the slow and heavy-moving armoured dinosaurs of the period, as well as of the lightest and most bird-like of the dinosaurs. Finely rounded, complete limbs from eight to ten feet in length are found, especially those of the carnivorous dinosaurs, perfect even to the sharply pointed and recurved tips of their toes." From this wonderful mausoleum Prof. Osborn estimates that remains of no less than 73 individuals were obtained by his party; but, inclusive of the weathered-out bones, it may be conjectured that the total must have reached at least 100 head. The area probably represents an old river-bar, the still waters of which arrested the course of the carcasses on their seaward journey. The paper is illustrated by excellent restorations from the facile pencil of Mr. C. R. Knight.

Two important contributions to our knowledge of the chimæroid fishes of Japan are made by Prof. Dean in the *Journal of the College of Science of Tokyo University* (vol. xix., articles 3 and 4). In the first of these the author treats of the two Japanese species of true chimæra (*Chimaera phantasma* and *C. mitsukurii*) and their egg-cases. Of the former species it is stated that while sometimes the fishermen will catch from twenty to thirty specimens a day in water varying between 50 and 300 fathoms in depth, on other occasions they do not find a single example for days. Although sluggish in their movements when kept in baskets in shallow water (where they soon die), there is reason to believe that in their normal haunts these fishes display considerable activity. Their egg-cases are larger than those of any other species. In the second memoir, Prof. Dean discusses the structure and affinities of the long-snouted chimæra (*Rhinochimaera pacifica*), which has been made the type of a genus by itself, although there is some doubt whether it is really entitled to generic distinction from *Harriotta raleighana*, obtained in deep water about 1894 by the *Albatross* near the Bermudas. The most interesting feature observed in the type specimen of the former was the complete distinctness of the palato-quadrate-bar from the cranium proper, this being thought at first to indicate that the skull was not of the true autostylic type. Other specimens showed, however, that the feature was not constant, although its existence in even one specimen tends to support the view that the autostylic skull of the Dipnoi is a specialised derivative from the hyostylic type characteristic of the fringe-finned ganoids.

THE most recent addition to the literature of cotton cultivation issued by the Imperial Department of Agriculture for the West Indies constitutes No. 31 of the pamphlet series, and is entitled the "A.B.C. of Cotton Planting." The method is adopted of providing the information in the form of question and answer, which combines brevity and precision.

CONTINUING his researches into the parthenogenetic development of embryos of *Thalictrum purpurascens*, Mr. Overton states in the May number of the *Berichte der deutschen botanischen Gesellschaft* that in these cases no reduction takes place in the number of chromosomes. The list of plants for which parthenogenesis has been established includes *Antennaria alpina*, species of *Alchemilla*, and *Taraxacum officinale*.

IN the first part of the *Bulletin* of the Imperial Society of Naturalists of Moscow, Mr. J. Gerassimow adds another paper to his contributions to the physiology of the cell. In cultures of *Spirogyra crassa* and allied species he obtained abnormal cells, without nuclei, or with excess of nuclear matter, or with two nuclei, by cooling the cultures in which the filaments were in an active stage of division. The result of changing the proportion of nuclear substance to cell contents was to cause irregularity of growth, so that where the nuclear substance was in excess, cell division was retarded, but general growth accelerated.

WE have received a copy of a pamphlet entitled the "Advantages of Ambidexterity," which may be obtained from Messrs. Sampson Low, Marston and Co., Ltd., price 6d. The booklet contains a lecture, delivered before the Ambidextral Culture Society by the honorary secretary, Mr. John Jackson, dealing with the "advantages accruing to any and every individual who may acquire the faculty of using both hands with equal facility."

AN unpretentious magazine has just appeared under the title of *Discovery*; and it merits encouragement because its aims are to publish trustworthy information on scientific and other topics. In the first number, Dr. J. Oldfield writes on diet, Dr. Edith Temple Orme on the modern education of women, Mr. A. A. Buss on spectroscopy, and Mr. A. C. D. Crommelin on the total solar eclipse of August 30, 1905. Other subjects of popular interest are dealt with in shorter contributions. The editor is Mr. G. McKenzie Knight, and the London agents Messrs. Bensberg Bros., 7 Electric Parade, Seven Sisters Road, N.

THE Cambridge Scientific Instrument Company has just issued a useful illustrated list under the title "Technical Thermometry." It is a new, revised, and enlarged edition of an earlier catalogue entitled "The Measurement of Temperature by Electrical Means." Copies of the list may be obtained on application to the company. Among the chief contents may be mentioned sections dealing with electrical resistance thermometers, thermoelectric thermometers, continuous temperature recorders, and electrical resistance furnaces. The excellent illustrations and full descriptions will render the list very serviceable to teachers and investigators.

OUR ASTRONOMICAL COLUMN.

THE LINE SPECTRUM OF COPPER.—Some exceedingly interesting results have been obtained by Mr. A. S. King at Bonn during a detailed study of the line spectrum of copper under many various conditions of arc and spark discharges. Mr. King suggests that an accurate knowledge of the conditions which produce spectral changes can only be obtained by the detailed study of each element under every possible condition of temperature, vapour pressure, and electrical excitation, and to this end he has commenced with the line spectrum of copper.

He found that on using a high voltage, but small current, in producing the arc spectrum, the "spark" lines were shown on his photographs, and he attributes this phenomenon to the frequent interruptions of the arc producing electrical conditions similar to those obtaining in the spark discharge. Again, in the spark, he photographed the spectrum of the green luminous vapour outside the direct path of the spark, and found that whilst the air spectrum was almost entirely eliminated, there were very few changes amongst the intensities of the copper lines. As this outer layer would have, presumably, the same electrical conditions as, but a lower temperature than, the spark track, he suggests that the experiment affords strong evidence that the electrical condition, rather than the vapour density or

the temperature, is the governing factor in producing the various types of spectra.

Mr. King gives a table of the lines which he has studied, showing the behaviour of each line under the different conditions, and he also describes the experimental methods and the results obtained when the temperature, pressure, &c., were varied (*Astrophysical Journal*, No. 1, vol. xx.).

EPHEMERIS FOR THE RETURN OF ENCKE'S COMET.—A further extract from the ephemeris for the approaching return of Encke's comet, published by MM. Kaminsky and Oculitsch in No. 3962 of the *Astronomische Nachrichten*, is given below:—

Ephemeris oh. (M.T. Berlin).												
1904		α (app.)			δ (app.)		log r		log Δ			
		h. m. s.										
Sept.	8	...	1	49	33	...	+24	59	...	0.3183	...	0.1097
"	12	...	1	46	38	...	+25	34	...	0.3094	...	0.0828
"	16	...	1	43	6	...	+26	8	...	0.3002	...	0.0551
"	20	...	1	38	20	...	+26	41	...	0.2906	...	0.0266
"	24	...	1	32	21	...	+27	12	...	0.2806	...	9.9974
"	28	...	1	25	1	...	+27	40	...	0.2702	...	9.9677
Oct.	2	...	1	16	12	...	+28	3	...	0.2593	...	9.9377

According to the above, the comet should apparently be situated about half-way between β Arietis and α Triangulum on September 18, and, travelling thence in a W.N.W. direction, it should arrive very near to υ Piscium on October 2.

SUPPOSED RELATION BETWEEN SUN-SPOT MINIMA AND MAXIMA INTENSITIES.—From an analysis of Wolfer's relative numbers, M. Angot believes that he has discovered a connection between the intensity of a sun-spot minimum and the intensity of the succeeding maximum.

According to a table prepared by him, and published in No. 4 (1904) of the *Comptes rendus*, a minimum during which the number of spots is very small is followed by a maximum in which the spots are correspondingly few.

In accordance with this theory, the maximum now approaching should be a feeble one, the relative number for the spots not exceeding 70 or 80, because the relative number for the past minimum was very small, viz. about 3.0.

EPHEMERIS FOR COMET TEMPEL₂.—A continuation of the ephemeris for Tempel's second comet during the approaching apparition, taken from the daily ephemeris published by M. Coniel in No. 3962 of the *Astronomische Nachrichten*, is given below:—

Ephemeris 12h. (M.T. Paris).												
1904		α app.			δ app.		log Δ		1: r ² Δ ²			
		h.	m.	s.								
Sept.	7	...	15	7	9	...	-10	12	...	0.2361	...	0.142
"	11	...	15	16	36	...	-11	22	...	0.2380	...	0.143
"	15	...	15	26	26	...	-12	30	...	0.2398	...	0.145
"	19	...	15	36	39	...	-13	38	...	0.2416	...	0.147
"	23	...	15	47	15	...	-14	44	...	0.2433	...	0.149
"	27	...	15	58	14	...	-15	49	...	0.2450	...	0.151
Oct.	1	...	16	9	37	...	-16	53	...	0.2467	...	0.152
"	5	...	16	21	22	...	-17	53	...	0.2484	...	0.154

The comet is due at perihelion early in November. On September 9 it should apparently be between one and two degrees south of β Libræ, and on October 2 about one degree south of φ Ophiuchi. As this comet is likely to be only a faint object during this apparition, it may be a difficult one for observers in this country.

DIRECTION OF THE SUN'S PROPER MOTION.—In No. 3961 of the *Astronomische Nachrichten* Prof. Kobold discusses the proper motions of 144 stars chiefly taken from the catalogues of Porter and Bradley.

From the discussion he deduces the position of the anti-apex of the Sun's Way, and finds it to be a point near to α Argus having as its coordinates

$$A = 159^{\circ}.6, D = -54^{\circ}.7.$$

As a general result, he states that the stars, of which the motions are perpendicular to the parallactic motion, are situated in preponderating numbers in a zone which passes through the apex and anti-apex, and runs perpendicular to the plane of the Milky Way, the point towards which they appear to be travelling being situated near to α Argus.